PART I PHARMACOKINETICS

001. Pharmacokinetics is:
a) The study of biological and therapeutic effects of drugs
b) The study of absorption, distribution, metabolism and excretion of drugs
c) The study of mechanisms of drug action
d) The study of methods of new drug development

002. What does “pharmacokinetics” include?
a) Complications of drug therapy
b) Drug biotransformation in the organism
c) Influence of drugs on metabolism processes
d) Influence of drugs on genes

002. What does “pharmacokinetics” include?
a) Pharmacological effects of drugs
b) Unwanted effects of drugs
c) Chemical structure of a medicinal agent
d) Distribution of drugs in the organism

003. What does “pharmacokinetics” include?
a) Localization of drug action
b) Mechanisms of drug action
c) Excretion of substances
d) Interaction of substances

004. The main mechanism of most drugs absorption in GI tract is:
a) Active transport (carrier-mediated diffusion)
b) Filtration (aqueous diffusion)
c) Endocytosis and exocytosis
d) Passive diffusion (lipid diffusion)

005. What kind of substances can’t permeate membranes by passive diffusion?
a) Lipid-soluble
b) Non-ionized substances
c) Hydrophobic substances
d) Hydrophilic substances

006. A hydrophilic medicinal agent has the following property:
a) Low ability to penetrate through the cell membrane lipids
b) Penetrate through membranes by means of endocytosis
c) Easy permeation through the blood-brain barrier
d) High reabsorption in renal tubules

007. What is implied by «active transport»?
a) Transport of drugs trough a membrane by means of diffusion
b) Transport without energy consumption
c) Engulf of drug by a cell membrane with a new vesicle formation
d) Transport against concentration gradient

008. What does the term “bioavailability” mean?
a) Plasma protein binding degree of substance
b) Permeability through the brain-blood barrier
c) Fraction of an uncharged drug reaching the systemic circulation following any route administration
d) Amount of a substance in urine relative to the initial doze

009. The reasons determing bioavailability are:
a) Rheological parameters of blood
b) Amount of a substance obtained orally and quantity of intakes
c) Extent of absorption and hepatic first-pass effect
d) Glomerular filtration rate

010. Pick out the appropriate alimentary route of administration when passage of drugs through liver is minimized:
a) Oral
b) Transdermal
c) Rectal
d) Intraduodenal

011. Which route of drug administration is most likely to lead to the first-pass effect?
a) Sublingual

b) Oral
c) Intravenous
d) Intramuscular

012. What is characteristic of the oral route?
a) Fast onset of effect
b) Absorption depends on GI tract secretion and motor function
c) A drug reaches the blood passing the liver
d) The sterilization of medicinal forms is obligatory

013. Tick the feature of the sublingual route:
a) Pretty fast absorption
b) A drug is exposed to gastric secretion
c) A drug is exposed more prominent liver metabolism
d) A drug can be administrated in a variety of doses

014. Pick out the parenteral route of medicinal agent administration:
a) Rectal
b) Oral
c) Sublingual
d) Inhalation

015. Parenteral administration:
a) Cannot be used with unconsciousness patients
b) Generally results in a less accurate dosage than oral administration
c) Usually produces a more rapid response than oral administration
d) Is too slow for emergency use

016. What is characteristic of the intramuscular route of drug administration?
a) Only water solutions can be injected
b) Oily solutions can be injected
c) Opportunity of hypertonic solution injections
d) The action develops slower, than at oral administration

017. Intravenous injections are more suitable for oily solutions:
a) True
b) False

018. Correct statements listing characteristics of a particular route of drug administration include all of the following EXCEPT:
a) Intravenous administration provides a rapid response
b) Intramuscular administration requires a sterile technique
c) Inhalation provides slow access to the general circulation
d) Subcutaneous administration may cause local irritation

019. Most of drugs are distributed homogeneously.
a) True
b) False

020. Biological barriers include all except:
a) Renal tubules
b) Cell membranes
c) Capillary walls
d) Placenta

021. What is the reason of complicated penetration of some drugs through brain-blood barrier?
a) High lipid solubility of a drug
b) Meningitis
c) Absence of pores in the brain capillary endothelium
d) High endocytosis degree in a brain capillary

022. The volume of distribution (Vd) relates:
a) Single to a daily dose of an administrated drug
b) An administrated dose to a body weight
c) An uncharged drug reaching the systemic circulation
d) The amount of a drug in the body to the concentration of a drug in plasma

023. For the calculation of the volume of distribution (Vd) one must take into account:
a) **Concentration of a substance in plasma**
b) Concentration of substance in urine
c) Therapeutical width of drug action
d) A daily dose of drug

024. A small amount of the volume of distribution is common for lipophylic substances easy penetrating through barriers and widely distributing in plasma, interstitial and cell fluids:

a) True
b) False

025. The term “biotransformation” includes the following:
a) Accumulation of substances in a fat tissue
b) Binding of substances with plasma proteins
c) Accumulation of substances in a tissue
d) Process of physicochemical and biochemical alteration of a drug in the body

026. Biotransformation of the drugs is to render them:
a) Less ionized
b) More pharmacologically active
c) More lipid soluble
d) Less lipid soluble

027. Tick the drug type for which microsomal oxidation is the most prominent:
a) Lipid soluble
b) Water soluble
c) Low molecular weight
d) High molecular weight

028. Pick out the right statement:
a) Microsomal oxidation always results in inactivation of a compound
b) Microsomal oxidation results in a decrease of compound toxicity
c) Microsomal oxidation results in an increase of ionization and water solubility of a drug
d) Microsomal oxidation results in an increase of lipid solubility of a drug thus its excretion from the organism is facilitated

029. Stimulation of liver microsomal enzymes can:
a) Require the dose increase of some drugs
b) Require the dose decrease of some drugs
c) Prolong the duration of the action of a drug
d) Intensify the unwanted reaction of a drug

030. Metabolic transformation (phase 1) is:
a) Acetylation and methylation of substances
b) Transformation of substances due to oxidation, reduction or hydrolysis
c) Glucuronide formation
d) Binding to plasma proteins

031. Biotransformation of a medicinal substance results in:
a) Faster urinary excretion
b) Slower urinary excretion
c) Easier distribution in organism
d) Higher binding to membranes

032. Conjugation is:
a) Process of drug reduction by special enzymes
b) Process of drug oxidation by special oxidases
c) Coupling of a drug with an endogenous substrate
d) Solubilization in lipids

033. Which of the following processes proceeds in the second phase of biotransformation?
a) Acetylation
b) Reduction
c) Oxidation
d) Hydrolysis

034. Conjugation of a drug includes the following EXCEPT:
a) Glucoronidation
b) Sulfate formation
c) Hydrolysis
d) Methylation

035. Metabolic transformation and conjugation usually results in an increase of a substance biological activity:
a) True
b) False

036. In case of liver disorders accompanied by a decline in microsomal enzyme activity the duration of action of some drugs is:
a) Decreased
b) Enlarged
c) Remained unchanged
d) Changed insignificantly

037. Half life (t ½) is the time required to:
a) Change the amount of a drug in plasma by half during elimination
b) Metabolize a half of an introduced drug into the active metabolite
c) Absorb a half of an introduced drug
d) Bind a half of an introduced drug to plasma proteins

038. Half life (t ½) doesn't depend on:
a) Biotransformation
b) Time of drug absorption
c) Concentration of a drug in plasma
d) Rate of drug elimination

039. Elimination is expressed as follows:
a) Rate of renal tubular reabsorption
b) Clearance speed of some volume of blood from substance
c) Time required to decrease the amount of drug in plasma by one-half
d) Clearance of an organism from a xenobiotic

040. Elimination rate constant (K_{elim}) is defined by the following parameter:
a) Rate of absorption
b) Maximal concentration of a substance in plasma
c) Highest single dose
d) Half life (t ½)

041. The most rapid eliminated drugs are those with high glomerular filtration rate and actively secreted but aren't passively reabsorbed:
a) True
b) False

042. Systemic clearance (CL_s) is related with:
a) Only the concentration of substances in plasma
b) Only the elimination rate constant
c) Volume of distribution, half life and elimination rate constant
d) Bioavailability and half life

PART II PHARMACODYNAMICS

001. Pharmacodynamics involves the study of following EXCEPT:
a) Biological and therapeutic effects of drugs
b) Absorption and distribution of drugs
c) Mechanisms of drug action
d) Drug interactions

002. Pharmacodynamics involves the study of following?
a) Mechanisms of drug action
b) Biotransformation of drugs in the organism
c) Distribution of drugs in the organism
d) Excretion of drug from the organism

003. Pharmacodynamics involves the following?
a) Information about main mechanisms of drug absorption
b) Information about unwanted effects
c) Information about biological barriers
d) Information about excretion of a drug from the organism

004. Pick out the answer which is the most appropriate to the term "receptor"
a) All types of ion channels modulated by a drug
b) Enzymes of oxidizing-reducing reactions activated by a drug
c) Active macromolecular components of a cell or an organism which a drug molecule has to combine with in order to elicit its specific effect
d) Carriers activated by a drug

005. What does "affinity" mean?
a) A measure of how tightly a drug binds to plasma proteins
b) A measure of how tightly a drug binds to a receptor
c) A measure of inhibiting potency of a drug
d) A measure of bioavailability of a drug

006. Target proteins which a drug molecule binds are:
a) Only receptors
b) Only ion channels
c) Only carriers

d) All of the above

007. An agonist is a substance that:
a) Interacts with the receptor without producing any effect
b) **Interacts with the receptor and initiates changes in cell function, producing various effects**
c) Increases concentration of another substance to produce effect
d) Interacts with plasma proteins and doesn't produce any effect

008. If an agonist can produce maximal effects and has high efficacy it's called:
a) Partial agonist
b) Antagonist
c) Agonist-antagonist
d) Full agonist

009. If an agonist can produce submaximal effects and has moderate efficacy it's called:
a) Partial agonist
b) Antagonist
c) Agonist-antagonist
d) Full agonist

010. An antagonist is a substance that:
a) Binds to the receptors and initiates changes in cell function, producing maximal effect
b) Binds to the receptors and initiates changes in cell function, producing submaximal effect
c) Interacts with plasma proteins and doesn't produce any effect
d) Binds to the receptors without directly altering their functions

011. A competitive antagonist is a substance that:
a) Interacts with receptors and produces submaximal effect
b) Binds to the same receptor site and progressively inhibits the agonist response
c) Binds to the nonspecific sites of tissue
d) Binds to one receptor subtype as an agonist and to another as an antagonist

012. The substance binding to one receptor subtype as an agonist and to another as an antagonist is called:
a) Competitive antagonist
b) Irreversible antagonist
c) Agonist-antagonist
d) Partial agonist

013. Irreversible interaction of an antagonist with a receptor is due to:
a) Ionic bonds
b) Hydrogen bonds
c) Covalent bonds
d) All of the above

014. Mechanisms of transmembrane signaling are the following EXCEPT:
a) Transmembrane receptors that bind and stimulate a protein tyrosine kinase
b) Gene replacement by the introduction of a therapeutic gene to correct a genetic effect
c) Ligand-gated ion channels that can be induced to open or close by binding a ligand
d) Transmembrane receptor protein that stimulates a GTP-binding signal transducer protein (G-protein) which in turn generates an intracellular second messenger

015. Tick the second messenger of G-protein-coupled (metabotropic) receptor:
a) Adenylyl cyclase
b) Sodium ions
c) Phospholipase C
d) cAMP

016. Tick the substance which changes the activity of an effector element but doesn't belong to second messengers:
a) cAMP
b) cGMP
c) G–protein
d) Calcium ions

017. The increase of second messengers' (cAMP, cGMP, Ca^{2+} etc.) concentration leads to:
a) Inhibition of intracellular protein kinases and protein phosphorylation
b) Proteinkinases activation and protein phosphorylation
c) Blocking of interaction between a receptor and an effector
d) Antagonism with endogenous ligands

018. Tick the substances whose mechanisms are based on interaction with ion channels
a) Sodium channel blockers
b) Calcium channel blockers
c) Potassium channels activators

d) All of the above

019. All of the following statements about efficacy and potency are true EXCEPT:
a) Efficacy is usually a more important clinical consideration than potency
b) Efficacy is the maximum effect of a drug
c) Potency is a comparative measure, refers to the different doses of two drugs that are needed to produce the same effect
d) The ED_{50} is a measure of drug's efficacy

020. Give the definition for a therapeutical dose:
a) The amount of a substance to produce the minimal biological effect
b) The amount of a substance to produce effects hazardous for an organism
c) The amount of a substance to produce the required effect in most patients
d) The amount of a substance to accelerate an increase of concentration of medicine in an organism

021. Pick out the correct definition of a toxic dose:
a) The amount of substance to produce the minimal biological effect
b) The amount of substance to produce effects hazardous for an organism
c) The amount of substance to produce the necessary effect in most of patients
d) The amount of substance to fast creation of high concentration of medicine in an organism

022. Which effect may lead to toxic reactions when a drug is taken continuously or repeatedly?
a) Refractoriness
b) Cumulative effect
c) Tolerance
d) Tachyphylaxis

023. What term is used to describe a more gradual decrease in responsiveness to a drug, taking days or weeks to develop?
a) Refractoriness
b) Cumulative effect
c) Tolerance
d) Tachyphylaxis

024. What term is used to describe a decrease in responsiveness to a drug which develops in a few minutes?
a) Refractoriness
b) Cumulative effect
c) Tolerance
d) Tachyphylaxis

025. Tachyphylaxis is:
a) A drug interaction between two similar types of drugs
b) Very rapidly developing tolerance
c) A decrease in responsiveness to a drug, taking days or weeks to develop
d) None of the above

026. Drug resistance is a term used to describe the loss of effectiveness of antimicrobial or antitumour drugs. This consideration is:
a) True
b) False

027. Tolerance and drug resistance can be a consequence of:
a) Drug dependence
b) Increased metabolic degradation
c) Depressed renal drug excretion
d) Activation of a drug after hepatic first-pass

028. Tolerance and drug resistance can be a consequence of:
a) Change in receptors, loss of them or exhaustion of mediators
b) Increased receptor sensitivity
c) Decreased metabolic degradation
d) Decreased renal tubular secretion

029. Tolerance develops because of:
a) Diminished absorption
b) Rapid excretion of a drug
c) Both of the above
d) None of the above

030. Dependence is often associated with tolerance to a drug, a physical abstinence syndrome, and psychological dependence (craving). This consideration is:
a) True
b) False

031. The situation when failure to continue administering the drug results in serious psychological and somatic disturbances is called?
a) Tachyphylaxis
b) Sensibilization
c) Abstinence syndrome
d) Idiosyncrasy

032. What is the type of drug-to-drug interaction which is connected with processes of absorption, biotransformation, distribution and excretion?
a) Pharmacodynamic interaction
b) Physical and chemical interaction
c) Pharmaceutical interaction
d) Pharmacokinetic interaction

033. What is the type of drug-to-drug interaction which is the result of interaction at receptor, cell, enzyme or organ level?
a) Pharmacodynamic interaction
b) Physical and chemical interaction
c) Pharmaceutical interaction
d) Pharmacokinetic interaction

034. What phenomenon can occur in case of using a combination of drugs?
a) Tolerance
b) Tachyphylaxis
c) Accumulation
d) Synergism

035. If two drugs with the same effect, taken together, produce an effect that is equal in magnitude to the sum of the effects of the drugs given individually, it is called as:
a) Antagonism
b) Potentiation
c) Additive effect
d) None of the above

036. What does the term "potentiation" mean?
a) Cumulative ability of a drug
b) Hypersensitivity to a drug
c) Fast tolerance developing
d) Intensive increase of drug effects due to their combination

037. The types of antagonism are:
a) Summarized
b) Potentiated
c) Additive
d) Competitive

038. The term "chemical antagonism" means that:
a) two drugs combine with one another to form an inactive compound
b) two drugs combine with one another to form a more active compound
c) two drugs combine with one another to form a more water soluble compound
d) two drugs combine with one another to form a more fat soluble compound

039. A teratogenic action is:
a) Toxic action on the liver
b) Negative action on the fetus causing fetal malformation
c) Toxic action on blood system
d) Toxic action on kidneys

040. Characteristic unwanted reaction which isn't related to a dose or to a pharmacodynamic property of a drug is called:
a) Idiosyncrasy
b) Hypersensitivity
c) Tolerance
d) Teratogenic action

041. Idiosyncratic reaction of a drug is:
a) A type of hypersensitivity reaction
b) A type of drug antagonism
c) Unpredictable, inherent, qualitatively abnormal reaction to a drug
d) Quantitatively exaggerated response

042. Therapeutic index (TI) is:
a) A ratio used to evaluate the safety and usefulness of a drug for indication
b) A ratio used to evaluate the effectiveness of a drug